

Attorney Docket No.: T3110(C)
Serial No.: 10/587,722
Filed: July 27, 2006
Confirmation No.: 2308

REMARKS

Amendments to the Claims

Claims 1 and 21 have been amended without prejudice to more clearly recite a preferred embodiment of applicants' invention which further differentiates its subject matter from the prior art.

Amended claim 1 and claim 21 now specifies that the porous bodies further include *a water soluble and/or water insoluble materials, neither of which are soluble in the non-aqueous media, incorporated into the polymeric lattice to be dispersed in the non-aqueous media when said polymeric material (a) and said surfactant (b) dissolve.* Support can be found in original claim 5 and on page 4 , lines 19-27.

Amended claims 1 and 21 further specify that the *polymeric material contained in the open cell lattice dissolves* in the non-aqueous media in less than 3 minutes (*claim 1*) or less than 30 sec (*claim 21*) *when 0.1gm of the porous body are stirred with 2 ml of the non-aqueous media at 20°C.* Applicants' claims already specify that the porous bodies include an open cell lattice containing a polymeric material which is soluble in non-aqueous media. The newly introduced limitation provides a criterion for the solubility of this polymer. The criterion follows from the description of the meaning of the "Dissolution time" and how it is measured which is given on page 8, lines 29-31. The details of this test are disclosed on page 11, lines 10-11, page 12, lines 25-26, page 16, lines 24-25 and

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page 17, lines 9-10; and further supported by the experimental results disclosed in tables 1 and 2.

Claim 4 specifies that the polymeric material recited in claim 1 is a polystyrene homopolymer (page 10, lines 14-15) or polyvinyl acetate

Claims 6 and 7 have been amended to change their dependence from claim 5 to claim 1.

Claim 22 has been amended to specify that step (a) involves providing an intimate mixture of the polymeric material, the surfactant, *and the water-soluble and/or water insoluble material in a liquid medium* (original claim 5, page 4 , lines 19-27 and page 6, lines 9-11).

Claim 5 is hereby canceled without prejudice.

Claim Rejections – 35 USC § 102

Claims 1-7 and 21-22 were rejected under 35U.S.C. 102(b) as being anticipated by Barby et al (U.S. 4,522,953 – hereinafter “Barby”). Applicants respectfully traverse this rejection

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Barby discloses *cross-linked homogenous porous polymeric materials* that are prepared by polymerization of monomers as the continuous phase in a high internal phase emulsion having above a critical limit of surfactant to ensure adequate absorbtivity. The porous materials may be dried and refilled with selected liquids and act as a high capacity reservoir." Abstract – Emphasis added

Barby specifically teaches that the polymers of the invention have a high capacity of absorbing and retaining hydrophobic liquids and, due to their cross-linked polymeric nature, an ability to carry liquids significantly better than that of hitherto known porous thermoplastic compositions. (Column 2, lines 31-50)

Barby further teaches that when the cross-linked polymeric materials are placed in non-aqueous media such as oleic acid (Example 1), liquid paraffin (Example 2), and perfume (Example 4) they have a high capacity to absorb these liquids.

In contrast to Barby, the aim of the present invention is to ensure that the polymer making up the lattice of the porous body *dissolves* in a non-aqueous medium, thereby releasing water soluble material and/or water-insoluble material that had been contained in the bodies (and which are not soluble in the non-aqueous medium) as a *dispersion* into the non-aqueous medium.

In contrast to Barby, applicants claims require that the *polymeric material making up the open lattice dissolves in the non-aqueous media in less than 3 minutes when 0.1gm of the porous body are stirred with 2 ml of the non-aqueous media at 20°C.*

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Applicants' respectfully point out that the reason their claims refer to porous bodies that dissolve or disperse is that in addition to the soluble polymer used in the lattice which *must dissolve rapidly* in non-aqueous media (Examples 1-5 and table 1 and 2), the invention also encompasses porous bodies which contain water soluble and/or water insoluble materials incorporated in the polymer lattice. Some of these materials may not dissolve in the non-aqueous media but rather are rapidly dispersed when the *lattice polymer dissolves* and the porous bodies disintegrate.

Barby is silent on polymer solubility: the words soluble or solubility do not appear in connection with any of the polymers taught by Barby.

A preferred crosslinked polymer taught by Barby was made by polymerizing an emulsion containing 10 ml styrene with 1 ml divinyl benzene (column 4, lines 17-18). According, Andrew Streitwieser Jr. and Clayton H. Heathcock in their textbook "Introduction to Organic Chemistry" (3rd edition, page 1113 - reference attached)

"Cross-linking has a large effect on physical properties because it restricts the relative mobility of polymer chains. Polystyrene, for example, is soluble in many solvents such as benzene, toluene, and carbon tetrachloride. Even with only 0.1% divinylbenzene, however, the polymer no longer dissolves but only swells". (Emphasis added)

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Thus, cross-linked polystyrene with 10 times lower crosslinking density than the polymer taught by Barby is already insoluble in non-aqueous media.

Absent disclosure of a porous body having a lattice *containing* 10 to 95% by weight of a *polymeric material which is soluble in non-aqueous media* wherein the extent of solubility is specified by the limitation that the lattice polymer *dissolves in the non-aqueous media in less than 3 minutes when 0.1gm of the porous body are stirred with 2 ml of the non-aqueous media at 20°C, and containing the additional recited ingredient*, Barby can not anticipate applicants claims.

Nor are applicants claims rendered obvious by Barby. Barby is directed to a very different technical objective than applicants' invention, namely porous bodies that can absorb and retain non-aqueous hydrophobic liquids. Barby solves this problem by using cross-linked polymers which do not dissolve at all when contacted with non-aqueous liquids but rather maintain their dimensional properties and absorb the liquid. In contrast, applicants invention is directed to porous bodies which rapidly disintegrate to release their contents when contacted with a non-aqueous media by utilizing a lattice polymer which rapidly dissolved in the non-queueous media.

Absent any teaching or suggestion of a porous body having a lattice *containing* 10 to 95% by weight of a *polymeric material which is soluble in non-aqueous media* and the further limitation that this lattice polymer *dissolves in the non-aqueous media in less than 3 minutes when 0.1gm of the porous body are stirred with 2 ml of the non-aqueous media*

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at 20 °C, and containing the additional recited ingredients, the reference does not present a *prima facie* case of obviousness.

Claims 4, 21 and 22 are even further removed from Barby because they recite further limitations not disclosed in Barby.

Claim 4 specifies that the polymeric material is a polystyrene homopolymer or polyvinyl acetate both of which are not cross-linked. In contrast, Barby is directed to porous bodies comprised of cross-linked polymers.

Claim 21 specifies that the polymeric material contained in the open lattice dissolves in the non-aqueous media in less than 30 seconds when 0.1gm of the porous body are stirred with 2 ml of the non-aqueous media at 20 °C. In contrast, the cross linked polymers of Barby are expected to be totally insoluble.

Claim 22 is directed to porous bodies recited in claim 1 which, as discussed above, employs lattice polymers that are entirely different from the cross-linked polymers disclosed by Barby and are made by an entirely different process than that disclosed by Barby.

In view of the above amendments and remarks, applicants respectfully request that the §102(b) rejection of claims 1-7 and 21-22 over Barby be reconsidered and withdrawn.

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Claims 1-7 and 21-22 were rejected under 35U.S.C. 102(b) as being anticipated by Kitagawa, Naotaka (PCT/US98/12797 – hereinafter “Kitagawa”).

Applicants respectfully traverse this rejection.

Kitagawa discloses a porous crosslinked hydrophilic polymeric material having cavities joined by interconnecting pores wherein at least some of the cavities at the interior of the material communicate with the surface of the material. Kitagawa teaches a process for producing the polymeric material which involves combining a hydrophilic monomer phase with an oil discontinuous phase to form an emulsion, and then polymerizing the emulsion. (Abstract)

Kitagawa further teaches that the “microbeads are useful in a variety of applications, including absorption of bodily fluids, absorption or transport of solvents or other chemicals, and scavenging of, e.g., aqueous fluids. (Page 4, lines 33-35 emphasis added)

In contrast to Kitagawa, the aim of the present invention is to ensure that the polymer making up the lattice of the porous body *dissolves* in a non-aqueous medium, thereby releasing water soluble material and/or water-insoluble material that had been contained in the bodies (and which are not soluble in the non-aqueous medium) as a *dispersion* into the non-aqueous medium.

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In contrast to Kitagawa, applicants claims require that the *polymeric material contained in the open lattice dissolves in the non-aqueous media in less than 3 minutes when 0.1gm of the porous bodies are stirred with 2 ml of the non-aqueous media at 20°C.*

As discussed above, the reason applicants' claims refer to porous bodies that dissolve or disperse is that in addition to the soluble polymer used construct the lattice which *must dissolve rapidly* in non-aqueous media (Examples 1-5 and table 1 and 2), the invention also encompasses porous bodies which contain water soluble and/or water insoluble materials incorporated into the polymer lattice. Some of these materials may not dissolve in the non-aqueous media but rather are rapidly dispersed when the *lattice polymer dissolves* and the porous bodies disintegrate.

Kitagawa is silent regarding the solubility of the polymers comprising the porous body, let alone that the polymers that make up the lattice are *soluble in the water immiscible non-aqueous media and dissolves to form a clear solution in the non-aqueous media in less than 3 minutes when 0.1gm of the porous bodies are stirred with 2 ml of the non-aqueous media at 20°C.* In fact, from the polymer chemistry disclosed by Kitagawa, the polymers are expected to be totally insoluble in non-aquous media because they are both hydrophilic and have a significant level cross-linking, e.g., 2% (page 6, line 6) which is 20 times higher than the level required to insolubilize a typical polymer in a good solvent as taught by Streitwieser Jr. and Heathcock.

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Absent disclosure of a porous body having a lattice *containing* 10 to 95% by weight of a *polymeric material which is soluble in non-aqueous media* wherein the extent of solubility is specified by the limitation that the polymer *dissolves in the non-aqueous media in less than 3 minutes when 0.1gm of the porous bodies are stirred with 2 ml of the non-aqueous media at 20°C, and containing the additional recited ingredients*, Kitagawa can not anticipate applicants' claims.

Nor are applicants' claims rendered obvious by Kitagawa. Kitagawa is directed to a very different technical problem than applicants' invention, namely *crosslinked hydrophilic* polymers which are useful for absorption of bodily fluids, absorption or transport of solvents or other chemicals, and scavenging of, e.g., aqueous fluids. Kitagawa solves this problem by using hydrophilic cross-linked polymers. In contrast, applicants' invention is directed to porous bodies which rapidly disintegrate to release their contents when they are contacted with non-aqueous liquids by utilizing a lattice polymer which rapidly dissolves in the non-aqueous media.

Absent any teaching or suggestion of a porous body having a lattice *containing* 10 to 95% by weight of a *polymeric material which is soluble in non-aqueous media* measured by the further limitation that the polymer *dissolves in the non-aqueous media in less than 3 minutes when 0.1gm of the porous bodies are stirred with 2 ml of the non-aqueous media at 20°C, and containing the additional recited ingredient*, the reference does not present a *prima facie* case of obviousness.

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Claims 4, 21 and 22 are even further removed from Kitagawa because they recite further limitations not disclosed in Kitagawa.

Claim 4 specifies that the polymeric material is a polystyrene homopolymer or polyvinyl acetate both of which are neither hydrophilic nor cross-linked. In contrast Kitagawa employs hydrophilic cross-linked polymers.

Claim 21 specifies that the polymeric material which is soluble in the non-aqueous media dissolves in the non-aqueous media in less than 30 seconds when 0.1gm of the porous bodies are stirred with 2 ml of the non-aqueous media at 20 °C. Kitagawa is silent regarding polymer solubility and the cross linked polymers of Kitagawa are expected to totally insoluble.

Claim 22 is directed to porous bodies recited in claim 1 which as discussed above employs lattice polymers that are entirely different from the cross-linked polymers disclosed by Kitagawa and which are made by an entirely different process than that disclosed by Kitagawa.

In view of the above amendments and remarks, applicants respectfully request that the §102(b) rejection of claims 1-7 and 21-22 over Kitagawa be reconsidered and withdrawn.

In light of the foregoing amendment and remarks, applicants respectfully request that the application be allowed to issue.

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If a telephone conversation would be of assistance, Applicants' undersigned agent invites the Examiner to telephone at the number provided.

Respectfully submitted,

/ Michael P. Aronson /

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Third Edition

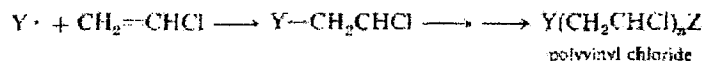
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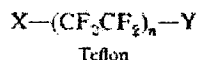
Sec. 34.5

Polymer
Chemistry

Vinyl chloride is manufactured on an enormous scale, primarily for making polyvinyl chloride, PVC. The 1983 production of PVC was 6.07 billion pounds. Vinyl chloride is manufactured mostly by dehydrochlorination of 1,2-dichloroethane (ethylene dichloride). In 1974 the Occupational Safety and Health Administration concluded that vinyl chloride is a human carcinogen and set maximum limits to exposure.

Polyvinyl chloride is an extremely hard resin. In order to alter the physical properties of the polymer, low molecular weight liquids called **plasticizers** are added in the polymer formulation. Bis-2-ethylhexyl phthalate is one of the compounds added to polyvinyl chloride as a plasticizer. The resulting polymer has a tough leathery or rubber-like texture. It is used in plastic squeeze bottles, imitation leather upholstery, pipes, and so on.

Polytetrafluoroethylene or "Teflon" is a perfluoro polymer having great resistance to acids and organic solvents. It is used to coat "nonstick" frying pans and other cooking surfaces.



Polystyrene is an inexpensive plastic used to manufacture many familiar household items. It is a hard, colorless, somewhat brittle material.



In the simple formulation of polystyrene, the end groups have been omitted. This simplification is common in the symbolism of polymer chemistry. The end groups constitute a minute portion of a high molecular weight polymer, although their character has a significant effect on the properties of the polymers.

The incorporation of divinylbenzene into the polymerization of styrene provides **cross-linking** because the two vinyl groups can participate in two separate chains and produce a three-dimensional network. Cross-linking has a large effect on physical properties because it restricts the relative mobility of polymer chains. Polystyrene, for example, is soluble in many solvents such as benzene, toluene, and carbon tetrachloride. Even with only 0.1% divinylbenzene, however, the polymer no longer dissolves but only *swells*. This property is important in many uses of polystyrene-derived materials. An example is the polymer used for the Merrifield peptide syntheses (page 949). The 1983 production of polystyrene in its various forms, including copolymers, was 5.55 billion pounds.

Acrylonitrile is another important monomer manufactured in large quantity for use in synthetic fibers and polymers; its 1983 production in the United States was 1.07 million tons. It was once prepared industrially by addition of HCN to acetylene.

